Leveraging our 890-square-mile Critical Infrastructure Test Range, the INL provides large-scale, independent, end-to-end testing of next-generation communication infrastructure including 3G cellular, fiber optics, and microwave systems.

Idaho's Communication Test Bed

National Security

Idaho National Laboratory

Our nation's reliance on wireless and Internet technology is rapidly evolving as more corporations and government agencies, employees, and handheld devices include mobile connectivity for both voice and data. The competitive advantage offered by a mobile workforce is leading many corporations to make wireless integration and convergence a top business priority. Similarly, military systems worldwide are rapidly embracing next-generation commercial technologies to accelerate network-centric capabilities and provide enhanced situational awareness.

While handheld devices such as laptops, Blackberrys, and cell phones once had limited mobility and range, they are rapidly incorporating new and multiple protocols such as Wi-Fi, broadband cellular (3G), and Bluetooth on a single platform to increase their effectiveness and agility. Worldwide there is exponential growth in public Wi-Fi access points, and new wireless protocols such as WiMAX and 3G cellular continue to evolve and expand the range and speed of these devices. Additionally, critical infrastructure networks, previously isolated or connected with dedicated wireline circuits, are incorporating Zigbee for wireless sensor networks, wireless LANs for maintenance functions, and cellular or Internet based backhaul to manage control centers.

Yet with all the buildup surrounding wireless technology, few understand the complexities surrounding wireless protocols and security, the risks of converged network infrastructures, need for interoperability of communication systems, or mitigation measures to safely use and improve new technologies in both commercial and military environments.

INL Capabilities

As part of Idaho National Laboratory's Critical Infrastructure Test Range, engineers have constructed and operate a series of infrastructure test beds within a public research complex. The combined assets and expertise provide an ideal location for independent, real-world performance and vulnerability testing. Additionally, many of INL's assets are operated and tested in conjunction with commercial partners like Bechtel Telecommunications, one of the largest infrastructure building companies in the world, and major control systems vendors including ABB, Areva, General Electric and Siemens.

As a federal funded national laboratory, INL also works closely with customers from the departments of Defense, Energy and Homeland Security to define their testing needs for interoperability, standards verification, priority access signaling, and other critical infrastructure concerns. This cooperative effort provides wireless carriers, vendors and government agencies with "one-stop shopping" for an integrated test environment.

Continued on back

Continued from front

Located on 890 square miles of federally owned and managed landscape, INL's communications test bed provides much cleaner frequency spectrum with little radio-frequency or background interference from urban congestion or military test sites. Over the last 50 years hundreds of millions of dollars in infrastructure has been placed at INL, allowing the laboratory to function like its own small city, or series of telecommunications and Internet service providers.

Securing Communications Systems

Building on INL's technical capabilities and critical infrastructure protection mission, INL engineers and researchers have the ability to perform vulnerability and risk assessments, tool development, and interdependency modeling and simulation for improving security while restricting access to proprietary data.

Through programs funded by the departments of Energy and Homeland Security, our communications infrastructures is available to government and commercial customers for research and development work within the wireless and telecommunications sector. Capabilities also exist to examine the interdependencies that exist between communications equipment and other critical infrastructure sectors such as electrical, Internet and computing, and manufacturing and industrial control systems.

INL is authorized by the National Telecommunications and Information Administration to operate as an experimental radio station. Combined with its geographic isolation, INL can test a wide variety of existing and emerging wireless systems with a view toward science or technology development. Our test beds are enhanced by our technically experienced research and development, engineering, and critical infrastructure protection staff whose capabilities include telecommunications design, systems deployment and integration, simulation research, high-performance computing, cyber security and process control systems.

As the use of wireless and communications technology increases, new security protocols, independent verification and validation, interoperability testing, and tool development will be essential for supporting the long-term survivability of critical infrastructures, personal communications devices, and nationwide control networks.

For more information

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INL is a U.S. Department of Energy national laboratory operated by Battelle Energy Alliance

Assets:

- Lab and full-scale networks
- Two independent fiber loops
- Mountaintop RF facilities
- Ground-based towers and facilities
- Mobile trailers and towers
- Anechoic chamber and RF test labs
- RF propagation and network simulation
- Cyber Security Test Bed
- Personal Electronic Device Security Test Bed
- Control Systems and SCADA Test Beds
- DHS Control System Security Center
- Power line communications systems and test beds
- Over 1,000 miles of railroads
- Unmanned Aerial Vehicles (UAV) landing strip
- Access-controlled federal reservation with 7x24 security forces

Services:

- Lab evaluation and testing
- Full-scale range testing
- Independent Validation & Verification
- Test plan/procedure development
- Range scenario/exercise development
- Vulnerability Assessments/ Testing
- Performance, robustness, interoperability testing
- System integration
- Application/device testing

Technologies:

- Cellular test bed systems
- Wireless Personal Area Networks (Bluetooth, Zigbee, etc.)
- Wireless Local Area Networks (Wi-Fi, 802.11)
- Wireless Metropolitan Area Networks (WiMAX)
- Voice over IP
- PSTN Simulators/SS7 Switches
- Wireless Local Loop
- Fiber Optic, SONET, ATM, DWDM
- Antenna Test Range
- Smart Antennas
- Land Mobile Radio
- Radio Paging Networks
- Emergency responder operations/priority services
- Software-defined radios
- Variety of HF, VHF, UHF communications systems
- Point-to-Point and Point-to-Multipoint systems
- Analog and Digital Microwave
- Ad Hoc, Mesh, and Self Forming Networks